<u>Moroccan Association of Researchers and Scholars (MARS)</u>

ON-LINE DEBATE MAY 27, 2002

"The Role of Science in the Contemporary World".

Guest : Prof. Mahdi ELMANDJRA

"Le développement c'est la science devenue culture »

René Maheu (1965)

The above sentence which was is taken from the speech made by the Director general of UNESCO at the World Conference of the Ministers of Science and Technology (Vienna, 1965) sums up very concisely the relationship of science to society. Science becomes significant and meaningful only when it is transformed into a culture that is when it is fully integrated by a society through its own system of values.

It is a real pleasure for me to be in contact with the members of MARS for this on-line discussion. I have followed with great interest and sympathy the evolution of this network which is promising and which can no doubt make a valuable contribution to the development of science in Morocco through a better communication between its scientists, researchers and scholars whether they be inside or outside of the country. It is a privilege of which I am proud and thankful.

The topic of this debate, as defined by its organizers, is quite vast one and I do not have the slightest pretension of being able to even define its contours and much less so the essence of its substance. All I have tried to do is to raise implicitly or explicitly certain issues and questions which have a bearing on the interaction between science and society in the world of today.

What follows is neither an analysis of the problematique of science in the contemporary world nor a recipe with a set of solutions. It is simply a modest and incomplete inventory of questions and issues which may have a direct bearing on the topic to be discussed.

DATA

According to "google" there are 40.200.000 documents dealing with "science" and 1.070.000 which concern "science and contemporary world". When dealing with most countries of the third world it is difficult to find reliable data or any data at all concerning science. In the UNESCO Statistical Yearbook (1999) one does not even find any entry under Morocco. See :
http://www.uis.unesco.org/en/stats/stats0.htm

If we refer to the site of the "Direction des Statistiques" of the Government of Morocco there are likewise no indicators in the area of science. See : **http://www.statistic.gov.ma/**. So let us simply not this big shortcoming at the level of data. Show me your science and technology indicators and I shall tell what is the level of your economic and social development.

Governmental statistics vary as to the amount invested in R&D. Some sources mention the figuere of 0.4% of the GNP and indicate that there are about 5 researchers per 10.000 people.

SCIENCE STRATEGIES AND POLICIES

Science strategies and policies require a long term vision and the selection of clear priorities as an integral part of development plans. They call for important changes in mental structures and require innovation and creativity. Thus the need for the respect of human rights and academic freedom.

It is clearly established today that one of the main causes of brain drain is the lack of freedom of expression in institutions of higher learning and research. It is estimated that Africa has lost over one third of its professional “cadres”. Over 25.000 africans belonging to this category immigrate annually to the North.

A developed country is one that is capable of making a rational use of its human resources. This is a major problem facing policy makers in the South.

POLITICAL ASPECTS

The major changes which the international scene has undergone in the last ten years have important implications for science. The end of the “cold war” and the major “hot” wars (Gulf War, Bosnia, Afghanistan ….) which the world has witnessed have radically changed the international context in which science evolves.

We now live under the hegemony of one single power which dictates to the world what it should do, when and where with no recourse to any legitimate source for arbitration. The international institutions which were created to carry out this regulatory function are presently paralyzed.. This unprecedented unbalance of power is likely to last for at least another ten years before countries like China, India, Japan and eventually a united Europe occupy the forefront in the place of the United States.

This situation has other negative effects as it brings support to unrepresentative systems of government in the third world who do not care about the development of science and care only about to remain in power. These are the regimes which the big powers back up. Governments which do not care in the least about the development of science and technology and which are glad when the most competent elements of the country immigrate.

This hegemony has also brought along with it a “terrorism through science” that is the use of scientific advantages not only to wage wars agains innocent populations for a variety of reasons including the need to test new weapons as was the case of those against Iraq and Afghanistan more recently. These are what I call “civlizational wars”.

“Terrorism through science” is also when use your scientific and military power to prevent other countries from developing similar technologies to those which you master in order to maintain your supremacy. This is why all the talk of arms of *massive destruction* is most hypocritical issue as it comes from instances which have a huge capacity to overkill the whole population of the globe.

What we have witnessed and what is still going in Palestine is one of the worst examples of how science and technology are used to increase the suffering of populations and to eradicate them at will. Where is the “conscience “ of science and scientists if the face of this State terrorism.

ECONOMIC CONSIDERATIONS

Some of the basic issues which science is called upon to tack and in which it has not been very successful in the major parts of the planet are : illiteracy, education, food, health, water, environment, and the fight against poverty and social injustice..

On the economic side we have to note the recent huge increases in defense spending in countries such as the United States where the military budget for 2003 will increase by $ 48 billion dollars and will thereby reach the figure of $380 billion dollars (11 times the GNP of Morocco) of 330 million . This amount is superior to the total of the next 14 largest military expenditures in the world put together.

The five biggest American armament firms (Lockheed Martin, Boeing, Raytheon, General Dynamics, Northrop Grauman) had a total turn over of around $ 65 billion dollars in 1999.

The USA will spend on research (public sector alone) over $ 100 billion dollars – a record figure (Le Monde 25-01-02). Over 50 % of that amount goes to military research .

Science as a factor of inequality between and within countries ?

Science can not by itself be a negative factor in any societal process. It is the way in which it is used which brings about these negative elements.

A major change in contemporary society is that no geographical unit is economically viable unless it disposes of a market of a minimum of about 300 million consumers. The fragmentation of the the third world and Africa and the Arab world in particular are a serious obstacle to the development of science. It is a question of "critical mass" – Europe and some Est Asian countries have well understood this point.

Critical mass is essential in the areas of scientific research which call for great sums of money which few countries in the world can cover by themselves.

SOCIAL DIMENSION

It is sad to notice that in a society such as ours in which Islam is the main source of values, a religion which accords a high social and even spiritul status to science, to see how the place of science and the scientists has regressed in the eyes and acts of its people. The word science occurs 115 times in the Koran (count based on the the "Shakr" computerized CD).

The revalorization of the status of the scientists, the researchers and all those associated with the transmission of knowledge is an essential prerequisite. The effectiveness of science in the solution of the urgent problems confronting societies in the Third World ?

CULTURAL DETERMINANTS

The following quotations from Prigogine raise in my view fundamental issues with respect to the philosophy of science. They relativise the concepts of “neutrality” and “universality” of science

Prigogine “La Nouvelle Alliance » (1979) :

« *Il est urgent que la science se reconnaisse comme partie intégrante de la culture au sein de laquelle elle se développe. » (p. 23)*

Nous pensons que notre science s’ouvrira a l’universel lorsqu’elle cessera de nier, de se prétendre étrangère aux préoccupations des sociétés ou elle sera capable enfin d’un dialogue avec les hommes de toutes cultures, dont elle saura respecter les questions. » (p. 28)

« Nous pensons que la science d’aujourd’hui échappe au mythe Newtonien parce qu’elle a conclu théoriquement)a l’impossibilité de réduire la nature a la simplicité cachée d’une réalité régie par des lois universelles. » (p. 64)

DIVERSITY AND BIODIVERSITY

The very concepts of "diversity" and "biodiversity" have now a different meaning and content from the one they had a few decades ago because of the progress made in scientific research

and the increased awareness of the importance of ecological systems. See : **http://www.elmandjra.org/Biodiversity.htm**

In spite of all the progress made in science, one must remain modest as when it comes to our knowledge in certain areas we are still in a vast sphere of uncertainty. Take for instance just the inventory of the total living organisms on earth : the latest estimate vary from between 14 to over 30 million depending upon the studies (Nature 25-04-02). The error concerning the number of arthropods was even greater a new estimate of 4 to 6 millions compared to the figure of 45 millions advanced in 1982 !

KNOWLEDGE SOCIETY

We are moving from a society based on "production" to one based on "knowledge" a knowledge which is producing a huge information of a great diversity. In the field of science alone, there are almost 2.500.000 scientific articles published each year in over 60.000 scientific magazines - about one article every four minutes. A society in which the “process” has become more important than the “product”.

At the technological level the acceleration of innovation is impressive. A chip which use to contain less than 50.000 transistors 25 years ago can now hold 55 millions and this number is likely to increase to one billion within 5 years ! As impressive as these developments may be a basic question remains and that is the one of **relevance**. What has this progress contributed to improving the way of life of the more than two billion poor people who live on this planet.

The explosion of knowledge (which according to Richard Knight doubles Every seven year) is such that it has been said the one who knows is not so much the one who has knowledge at it is the one who knows who knows what .

COMMUNICATION

There are few areas, today, where science, technology and culture meet to the point of fusion as the one of cultural communication. The "highways of information" which are the byproduct of scientific innovation and technological creativity raise a number of basic issues when it comes to the content of the information transmitted and the tracing of the networks used.

Information has become both a source and an instrument of political, economic, social, cultural and scientific power. The very concept of communication is evolving rapidly due to technological progress and to the quantitative expansion of the use of the media which are more and more interdependent.

There is a quasi-monopoly on the part of about 5 countries which control over 90% of these media whereas the whole of the Third world accounts for less than 10% of the total communication expenditures of the Planet. If we limit ourselves to the advanced technologies then the share of the Third world plunges down to less than 3% .

SEE : < http://www.elmandjra.org/Cultcom.htm>

INTER-DISCIPLINARITY and the resistance of the “nationalism” of Disciplines. SCIENCE AND ETHICS : an immediate problem – human cloning. The first human clones are likely to see the day Italy within the next seven or eight months. Where does the freedom to carry out research starts and where does it end ?

PURPOSE (al-maqasid)

Von Bertalanfy wrote "if there is a purpose there is a system". There can be no science as a systemic phenomenon unless it has purpose. Ideally that purpose is **the improvement of the quality of life** and the stimulation of creativity and innovation. This purpose has now evolved to include survival of the human race and of the planet which are no longer immune from eradication in one way or another. This is the acid test for science today.

The most important question has always been and will always remain : "Science what for ?". The questioning does not concern science per say but the "what for?".

Mahdi Elmandjra
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